Model Name: P550HVN02.0

Issue Date : 2012/03/02

(*)Preliminary Specifications
(...)Final Specifications

Customer Signature	Date	AUO	Date
Approved By _____		Approval By PM Director Michael Goan _____	
Note		Reviewed By RD Director Eugene CC Chen _____ Reviewed By Project Leader Alex HM Chen _____	
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Contents

No		
		CONTENTS
		RECORD OF REVISIONS
1		GENERAL DESCRIPTION
2		ABSOLUTE MAXIMUM RATINGS
3		ELECTRICAL SPECIFICATION
	3-1	ELECTRIACL CHARACTERISTICS
	3-2	INTERFACE CONNECTIONS
	3-3	SIGNAL TIMING SPECIFICATION
	3-4	SIGNAL TIMING WAVEFORM
	3-5	COLOR INPUT DATA REFERENCE
	3-6	POWER SEQUENCE
	3-7	BACKLIGHT SPECIFICATION
4		OPTICAL SPECIFICATION
5		MECHANICAL CHARACTERISTICS
	5-1	PLACEMENT SUGGESTIONS
6		RELIABILITY TEST ITEMS
7		INTERNATIONAL STANDARD
	7-1	SAFETY
	7-2	EMC
8		PACKING
	8-1	DEFINITION OF LABEL
	8-2	PACKING METHODS
	8-3	PALLET AND SHIPMENT INFORMATION
9		PRECAUTION
	9-1	MOUNTING PRECAUTIONS
	9-2	OPERATING PRECAUTIONS
	9-3	ELECTROSTATIC DISCHARGE CONTROL
	9-4	PRECAUTIONS FOR STRONG LIGHT EXPOSURE
	9-5	STORAGE
	9-6	HANDLING PRECAUTIONS FOR PROTECT FILM
	9-7	OPERATING CONDITION IN PID APPLICATION

Record of Revision

Version	Date	Page	Description
0.0	2011/12/30		First preliminary spec release
0.1	2012/03/02	6	Modify 3.1.1 Electrical Characteristics Backlight Power Consumption: Typ 96.5, Max 105.6.
		9	Modify 3.2 Interface Connections :Pin 6 High/Open : Rotate Disable; GND : Rotate Enable
		11	Modify 3.3 Signal Timing Specification Vertical Section: Period min 1096.
		15	Modify 3.7.1 Electrical specification: all items
		16	Modify 3.7.2 Input Pin Assignment: Pin 13: N.C; and PWM dimming drawing.
		17	Modify 4. Optical Specification Rx:0.645 Ry:0.330 Gx:0.290 Gy:0.615 Bx:0.145 By:0.055
		20	Modify 5. Mechanical Characteristics: weight Typ 20kg.
		24	Cancel UL60065

1. General Description

This specification applies to the 54.6 inch Color TFT-LCD Module P550HVN02.0. This LCD module has a TFT active matrix type liquid crystal panel 1,920x1,080 pixels, and diagonal size of 54.6 inch. This module supports 1,920x1080 mode. Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 10-bit gray scale signal for each dot.

The P550HVN02.0 has been designed to apply the 10-bit 2 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth.

*** General Information**

Items	Specification	Unit	Note
Active Screen Size	54.6	Inch	
Display Area	1209.6(H) x 680.4(V)	mm	
Outline Dimension	1235.6(H) x 706.4(V) x 25.5(D)	mm	1
Driver Element	a-Si TFT active matrix		
Display Colors	10 bit (8bit+FRC), 1073.7M	Colors	
Number of Pixels	1,920x1080	Pixel	
Pixel Pitch	0.21 (H) x 0.63(W)	mm	
Pixel Arrangement	RGB vertical stripe		
Display Operation Mode	Normally Black		
Display Orientation	Landscape/Portrait Enable		
Surface Treatment	AG		Haze = 11%

Note:

(1)Dmax: 25.5mm (Front bezel to Driver cover); Dmin: 9.9mm (Front bezel to Bezel back)

2. Absolute Maximum Ratings

The followings are maximum values which, if exceeded, may cause faulty operation or damage to the unit

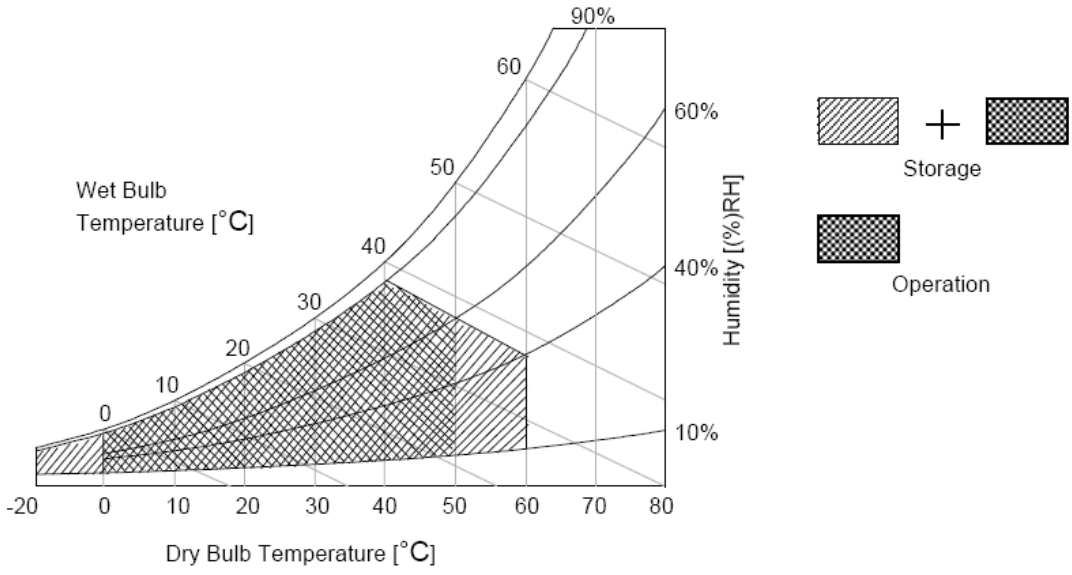
Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	Vcc	-0.3	14	[Volt]	Note 1
Input Voltage of Signal	Vin	-0.3	4	[Volt]	Note 1
Operating Temperature	TOP	0	+50	[°C]	Note 2
Operating Humidity	HOP	10	90	[%RH]	Note 2
Storage Temperature	TST	-20	+60	[°C]	Note 2
Storage Humidity	HST	10	90	[%RH]	Note 2
Panel Surface Temperature	PST		65	[°C]	Note 3

Note 1: Duration:50 msec.

Note 2 : Maximum Wet-Bulb should be 39℃ and No condensation.

The relative humidity must not exceed 90% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bulb temperature must not exceed 39℃.

Note 3: Surface temperature is measured at 50℃ Dry condition



3. Electrical Specification

The P550HVN02.0 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second is employed for LED driver.

3.1.1 Electrical Characteristics

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max		
LCD							
Power Supply Input Voltage		V_{DD}	10.8	12	13.2	V_{DC}	
Power Supply Input Current		I_{DD}	--	0.9	1.08	A	1
Power Consumption		P_C	--	10.8	12.96	Watt	1
Inrush Current		I_{RUSH}	-	-	5.5	A	2
Permissible Ripple of Power Supply Input Voltage (for input power=12V)		V_{RP}	--	--	V_{DD} * 5%	mV_{pk-pk}	3
LVDS Interface	Input Differential Voltage	$\lvert V_{ID} \rvert$	200	400	600	mV_{DC}	4
	Differential Input High Threshold Voltage	V_{TH}	+100	--	+300	mV_{DC}	4
	Differential Input Low Threshold Voltage	V_{TL}	-300	--	-100	mV_{DC}	4
	Input Common Mode Voltage	V_{ICM}	1.1	1.25	1.4	V_{DC}	4
CMOS Interface	Input High Threshold Voltage	V_{IH} (High)	2.7	--	3.3	V_{DC}	7
	Input Low Threshold Voltage	V_{IL} (Low)	0	--	0.6	V_{DC}	
Backlight Power Consumption		P_{BL}	--	96.5	105.6	W	
Life Time(MTTF)			50000	60000		--	8

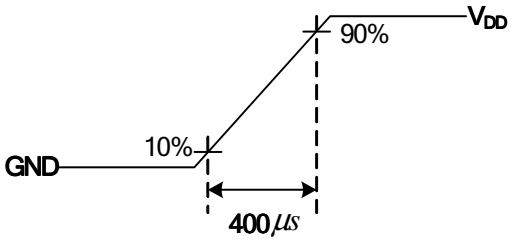
3.1.2 AC Characteristics

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max		
LVDS Interface	Receiver Clock : Spread Spectrum Modulation range	Fclk_ss	Fclk -3%	--	Fclk +3%	MHz	9
	Receiver Clock : Spread Spectrum Modulation frequency	Fss	30	--	200	KHz	9
	Receiver Data Input Margin Fclk = 85 MHz Fclk = 65 MHz	tRMG	 -0.4 -0.5	 -- --	 0.4 0.5	ns	10

Note :

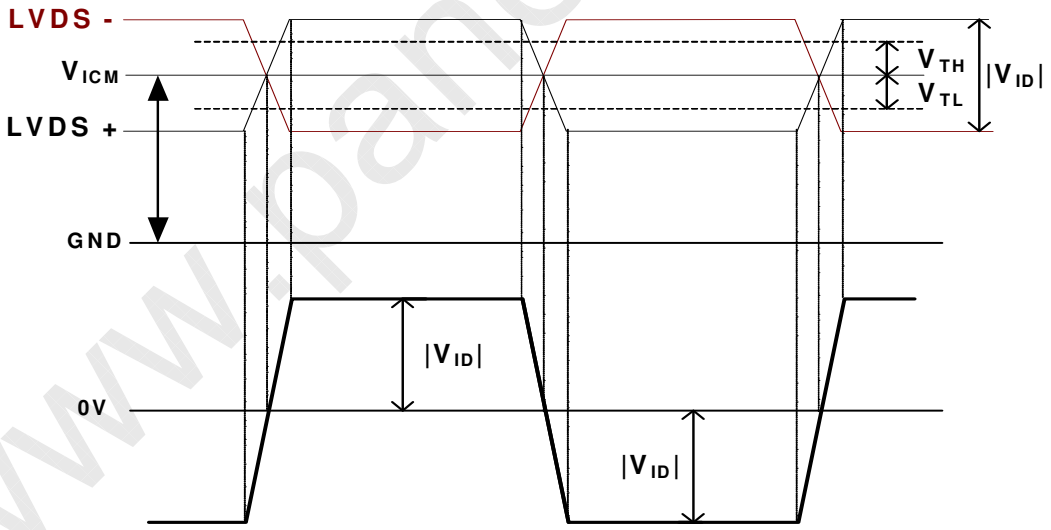
1. Test Condition:
   (1) V_{DD} = 12.0V
   (2) Fv = Type Timing, 60Hz, 120Hz or Other
   (3) F_{CLK} = Max freq.
   (4) Temperature = 25 ℃
   (5) Test Pattern : White Pattern

2. Measurement condition : Rising time = 400us



3. Test Condition:
   (1) The measure point of V_{RP} is in LCM side after connecting the System Board and LCM.
   (2) Under Max. Input current spec. condition.

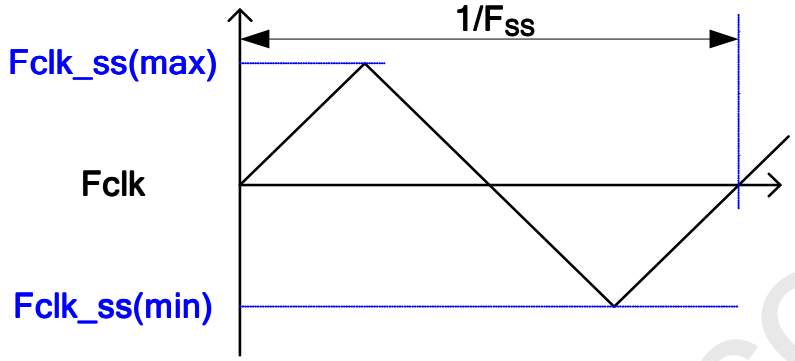
4. V_{ICM} = 1.25V



5. Do not attach a conducting tape to lamp connecting wire. If the lamp wire attach to conducting tape, TFT-LCD Module have a low luminance and the inverter has abnormal action because leakage current occurs between lamp wire and conducting tape.
6. The relative humidity must not exceed 80% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bulb temperature must not exceed 39℃. When operate at low temperatures, the brightness of LED will drop and the life time of LED will be reduced.
7. The measure points of V_{IH} and V_{IL} are in LCM side after connecting the System Board and LCM.

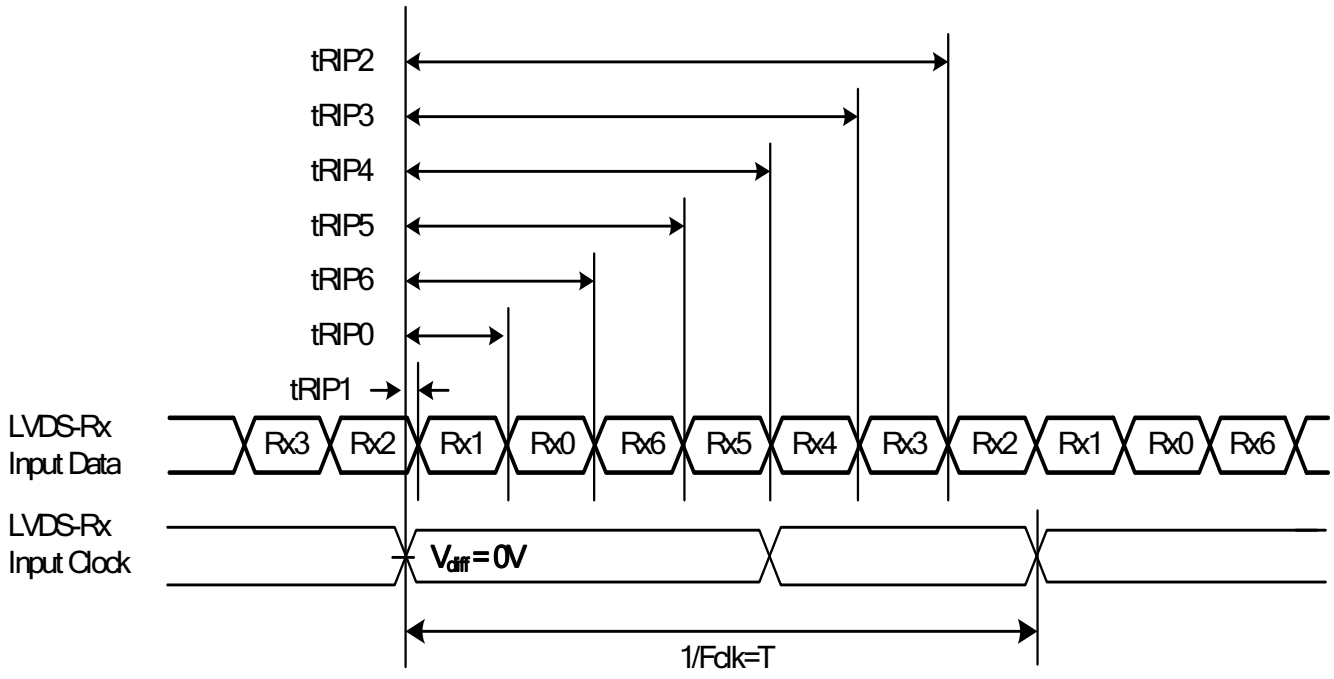
8. The lifetime (MTTF) is defined as the time which luminance of the LED is 50% compared to its original value. [Operating condition: Continuous operating at Ta = 25±2℃]

9. LVDS Receiver Clock SSCG (Spread spectrum clock generator) is defined as below figures



10. Receiver Data Input Margin

Parameter	Symbol	Rating			Unit	Note
		Min	Type	Max		
Input Clock Frequency	Fclk	Fclk (min)	--	Fclk (max)	MHz	**T=1/Fclk**
Input Data Position0	tRIP1	-|tRMG|	0	|tRMG|	ns	
Input Data Position1	tRIP0	T/7-|tRMG|	T/7	T/7+|tRMG|	ns	
Input Data Position2	tRIP6	2T/7-|tRMG|	2T/7	2T/7+|tRMG|	ns	
Input Data Position3	tRIP5	3T/7-|tRMG|	3T/7	3T/7+|tRMG|	ns	
Input Data Position4	tRIP4	4T/7-|tRMG|	4T/7	4T/7+|tRMG|	ns	
Input Data Position5	tRIP3	5T/7-|tRMG|	5T/7	5T/7+|tRMG|	ns	
Input Data Position6	tRIP2	6T/7-|tRMG|	6T/7	6T/7+|tRMG|	ns	



3.2 Interface Connections

- **LCD connector : JAE FI-RE51S-HF (JAE)or Compatible**

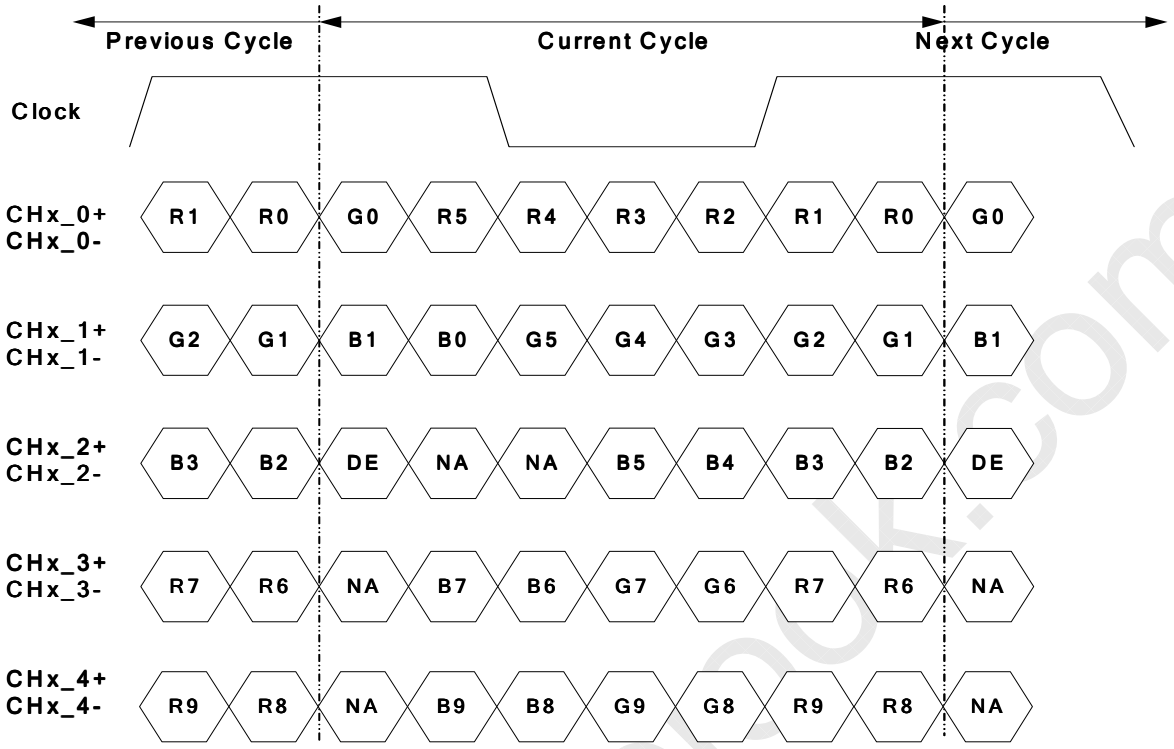
PIN	Symbol	Description	PIN	Symbol	Description
1	N.C.	AUO Internal Use Only	26	N.C.	AUO Internal Use Only
2	N.C.	AUO Internal Use Only	27	N.C.	AUO Internal Use Only
3	N.C.	AUO Internal Use Only	28	CH2_0-	LVDS Channel 2, Signal 0-
4	N.C.	AUO Internal Use Only	29	CH2_0+	LVDS Channel 2, Signal 0+
5	N.C.	AUO Internal Use Only	30	CH2_1-	LVDS Channel 2, Signal 1-
6	ROTATE	Panel Rotation Display Control High/Open : Rotate Disable GND : Rotate Enable	31	CH2_1+	LVDS Channel 2, Signal 1+
7	LVDS_SEL	Open/High(3.3V) for NS, Low(GND) for JEIDA	32	CH2_2-	LVDS Channel 2, Signal 2-
8	N.C.	No connection	33	CH2_2+	LVDS Channel 2, Signal 2+
9	N.C.	No connection	34	GND	Ground
10	N.C.	No connection	35	CH2_CLK-	LVDS Channel 2, Clock -
11	GND	Ground	36	CH2_CLK+	LVDS Channel 2, Clock +
12	CH1_0-	LVDS Channel 1, Signal 0-	37	GND	Ground
13	CH1_0+	LVDS Channel 1, Signal 0+	38	CH2_3-	LVDS Channel 2, Signal 3-
14	CH1_1-	LVDS Channel 1, Signal 1-	39	CH2_3+	LVDS Channel 2, Signal 3+
15	CH1_1+	LVDS Channel 1, Signal 1+	40	CH2_4-	LVDS Channel 2, Signal 4-
16	CH1_2-	LVDS Channel 1, Signal 2-	41	CH2_4+	LVDS Channel 2, Signal 4+
17	CH1_2+	LVDS Channel 1, Signal 2+	42	N.C.	AUO Internal Use Only
18	GND	Ground	43	N.C.	No connection
19	CH1_CLK-	LVDS Channel 1, Clock -	44	GND	Ground
20	CH1_CLK+	LVDS Channel 1, Clock +	45	GND	Ground
21	GND	Ground	46	GND	Ground
22	CH1_3-	LVDS Channel 1, Signal 3-	47	N.C.	No connection
23	CH1_3+	LVDS Channel 1, Signal 3+	48	V_{DD}	Power Supply, +12V DC Regulated
24	CH1_4-	LVDS Channel 1, Signal 4-	49	V_{DD}	Power Supply, +12V DC Regulated
25	CH1_4+	LVDS Channel 1, Signal 4+	50	V_{DD}	Power Supply, +12V DC Regulated
			51	V_{DD}	Power Supply, +12V DC Regulated

Note 1: All GND (ground) pins should be connected together and should also be connected to the LCD's metal frame.

Note 2: All V_{DD} (power input) pins should be connected together.

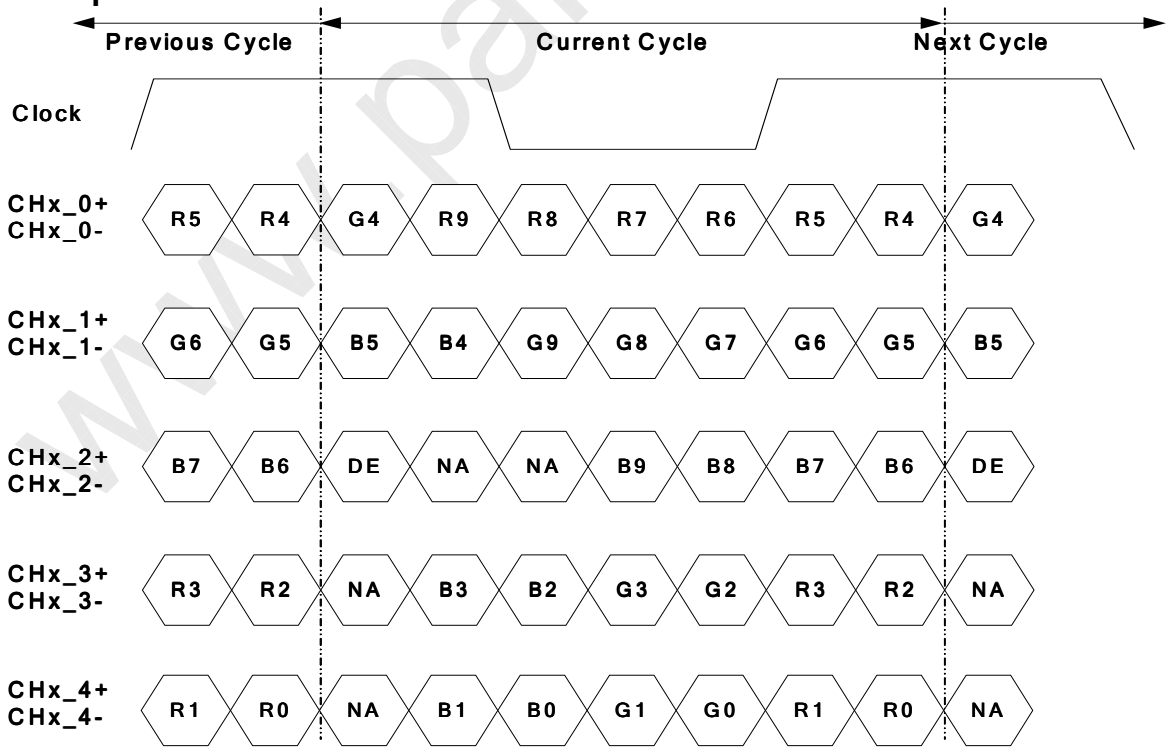
Note 3: All NC (no connection) pins please leave this pin unoccupied. It can not be connected by any signal (Low/GND/High).

LVDS Option = High/Open➔NS



Note: x = 1, 2, 3, 4…

LVDS Option = Low➔JEIDA



Note: x = 1, 2, 3, 4…

3.3 Signal Timing Specification

This is the signal timing required at the input of the user connector. All of the interface signal timing should be satisfied with the following specifications for its proper operation.

Timing Table (DE only Mode)

Vertical Frequency Range (60Hz)

Signal	Item	Symbol	Min.	Typ.	Max	Unit
Vertical Section	Period	Tv	1096	1125	1480	Th
	Active	Tdisp (v)		1080		Th
	Blanking	Tblk (v)	16	45	400	Th
Horizontal Section	Period	Th	1040	1100	1328	Tclk
	Active	Tdisp (h)		960		Tclk
	Blanking	Tblk (h)	80	140	368	Tclk
Clock	Frequency	Fclk=1/Tclk	50	74.25	82	MHz
Vertical Frequency	Frequency	Fv	47	60	63	Hz
Horizontal Frequency	Frequency	Fh	60	67.5	73	KHz

Notes:

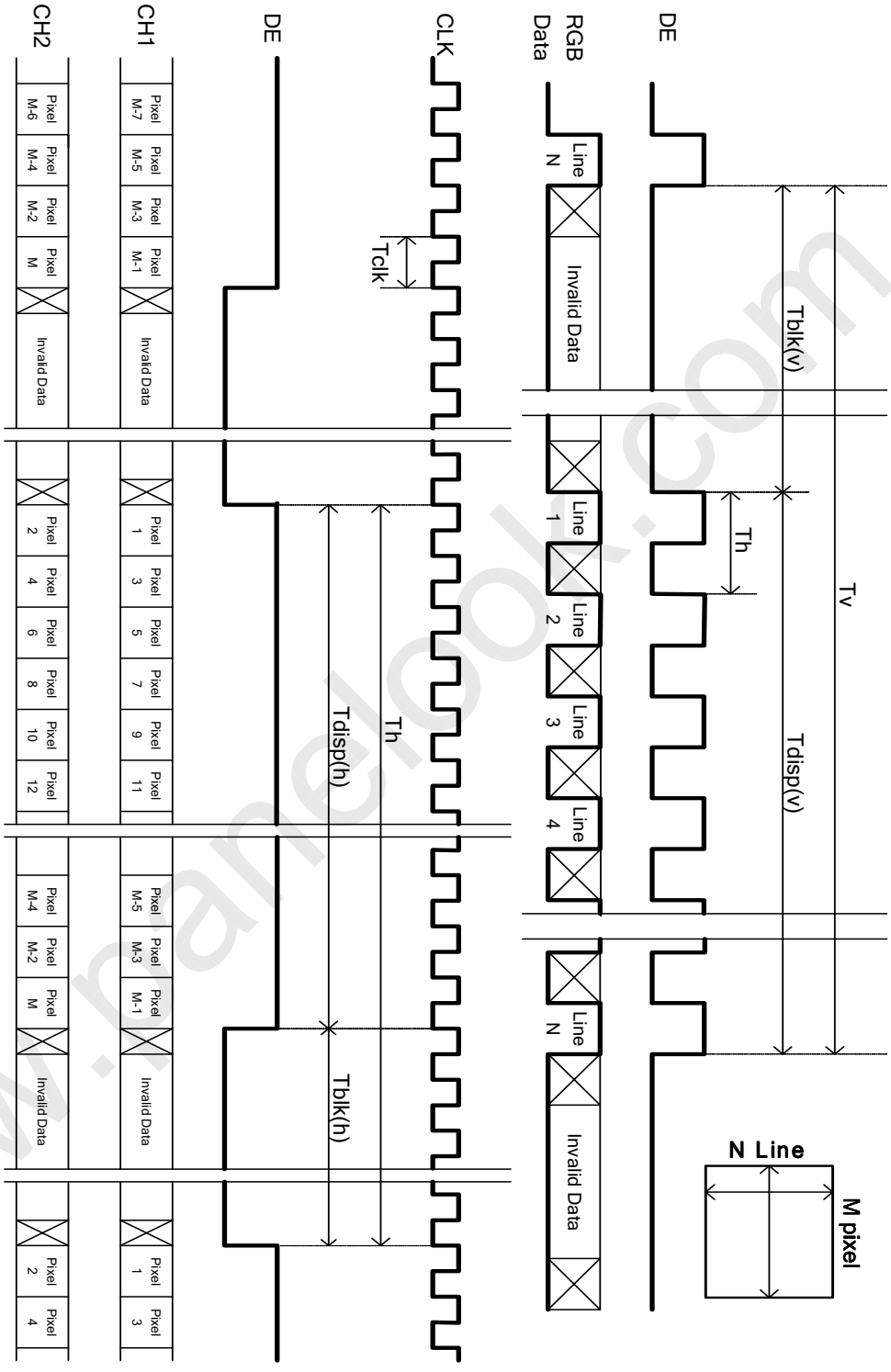
(1) Display position is specific by the rise of DE signal only.
Horizontal display position is specified by the rising edge of 1st DCLK after the rise of 1st DE, is displayed on the left edge of the screen.

(2)Vertical display position is specified by the rise of DE after a “Low” level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise of 1st DE is displayed at the top line of screen.

(3)If a period of DE “High” is less than 1920 DCLK or less than 1080 lines, the rest of the screen displays black.

(4)The display position does not fit to the screen if a period of DE “High” and the effective data period do not synchronize with each other.

3.4 Signal Timing Waveforms



3.5 Color Input Data Reference

The brightness of each primary color (red, green and blue) is based on the 10 bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

COLOR DATA REFERENCE

Color		Input Color Data																													
		RED										GREEN										BLUE									
		MSB									LSB	MSB									LSB	MSB									LSB
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
R	RED(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(001)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

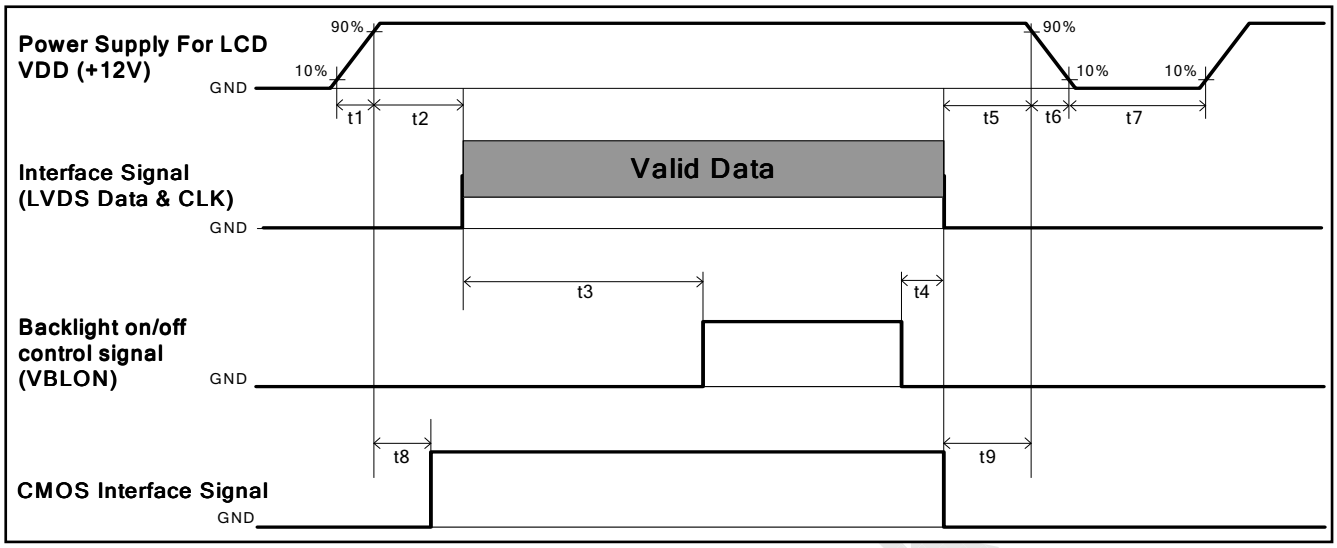
	RED(1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	GREEN(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

	GREEN(1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
B	BLUE(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

	BLUE(1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	BLUE(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

3.6 Power Sequence

◆ Power Sequence of LCD



Parameter	Values			Unit
	Min.	Type.	Max.	
t1	0.4	---	30	ms
t2	0.1	---	50	ms
t3	450	---	---	ms
t4	0 *1	---	---	ms
t5	0	---	---	ms
t6	---	---	--- *2	ms
t7	500	---	---	ms
t8	10	---	50	ms
t9	0	---	---	ms

Note:
(1) t4=0 : concern for residual pattern before BLU turn off.
(2) t6 : voltage of VDD must decay smoothly after power-off. (customer system decide this value)

3.7 Backlight Specification

The backlight unit contains 144pcs LED.

3.7.1 Electrical specification

	Item	Symbol		Condition	Spec			Unit	Note
					Min	Typ	Max		
1	Input Voltage	VDDB		-	22.8	24	25.2	VDC	-
2	Input Current	I_{DDB}		VDDB=24V		4.02	4.40	ADC	1
3	Input Power	P_{DDB}		VDDB=24V		96.5	105.6	W	1
4	Inrush Current	I_{RUSH}		VDDB=24V			10	Apeak	2
5	Control signal voltage	V_{Signal}	Hi	VDDB=24V	2	-	5.5	VDC	-
			Low		0	-	0.8		3
6	Control signal current	I_{Signal}		VDDB=24V	-	-	1.5	mA	-
7	External PWM Duty ratio (input duty ratio)	D_EPWM		VDDB=24V	0	-	100	%	4
8	External PWM Frequency	F_EPWM		VDDB=24V	90	180	240	Hz	4
9	DET status signal	DET	HI	VDDB=24V	Open Collector			VDC	5
			Lo		0	-	0.8	VDC	5
10	Input Impedance	Rin		VDDB=24V	300			Kohm	-

Note 1: Dimming ratio= 100%,（Ta=25±5℃, Turn on for 45minutes）

Note 2: MAX input current at all operating mode, measurement condition Rising time = 20ms (VDDB: 10%~90%)

Note 3: When BLU off (VDDB = 24V , VBLON = 0V) , IDDB (max) = 0.1A

Note 4: Less than 5% dimming control is functional well and no backlight shutdown happened

Note 5: Normal: 0~0.8V ; Abnormal : Open collector

3.7.2 Input Pin Assignment

LED driver board connector:

CI0114M1HRL-NH (Cvilux)

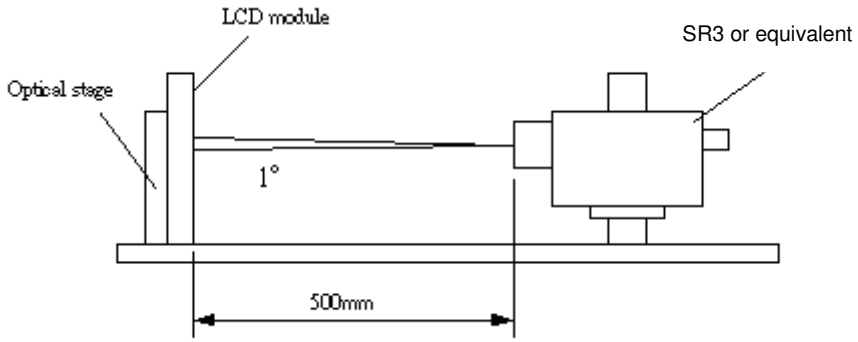
Pin	Symbol	Description
1	VDDB	Operating Voltage Supply, +24V DC regulated
2	VDDB	Operating Voltage Supply, +24V DC regulated
3	VDDB	Operating Voltage Supply, +24V DC regulated
4	VDDB	Operating Voltage Supply, +24V DC regulated
5	VDDB	Operating Voltage Supply, +24V DC regulated
6	BLGND	Ground and Current Return
7	BLGND	Ground and Current Return
8	BLGND	Ground and Current Return
9	BLGND	Ground and Current Return
10	BLGND	Ground and Current Return
11	DET	BLU status detection: Normal : 0~0.8V ; Abnormal : Open collector
12	VBLON	BLU On-Off control: BL On : High/Open (2V~3.3V); BL off : Low (0~0.8V/GND)
13	NC	NC
14	PDIM	External PWM (10%~100% Duty, open for 100%) < NC ; at Internal PWM mode>

IF External PWM function less than 5% dimming ratio, Judge condition as below:
(1)Backlight module must be lighted ON normally.
(2)All protection function must work normally.
(3)Uniformity and flicker could not be guaranteed

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 45 minutes in a dark environment at 25℃ while panel is placed in the default position. The default position is T-con side as the up side of panel. The value specified is at an approximate distance 50cm from the LCD surface at a viewing angle of φ and θ equal to 0°.

Fig.1 presents additional information concerning the measurement equipment and method.



Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max		
Contrast Ratio		CR	3200	4000	--		1
Surface Luminance (White)		L_{WH}	360	450	--	cd/m^2	2
Luminance Variation		$\delta_{WHITE(9P)}$	--	--	1.33		3
Response Time (G to G)		Tγ	--	6.5	10	Ms	4
Color Gamut		NTSC		72		%	
Color Coordinates							
	Red	R_X	Typ.-0.03	0.645	Typ.+0.03		
		R_Y		0.330			
	Green	G_X		0.290			
		G_Y		0.615			
	Blue	B_X		0.145			
		B_Y		0.055			
	White	W_X		0.28			
		W_Y		0.29			
Viewing Angle							5
	x axis, right(φ=0°)	θ_r	--	89	--	degree	
	x axis, left(φ=180°)	θ_l	--	89	--	degree	
	y axis, up(φ=90°)	θ_u	--	89	--	degree	
	y axis, down (φ=270°)	θ_d	--	89	--	degree	

Note:

1. Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance of } L_{on5}}{\text{Surface Luminance of } L_{off5}}$$

2. Surface luminance is luminance value at point 5 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see FIG 2. L_{WH}=Lon5 where Lon5 is the luminance with all pixels displaying white at center 5 location.
3. The variation in surface luminance, δWHITE is defined (center of Screen) as:

   $\delta_{WHITE(9P)}$= Maximum(L_{on1}, L_{on2},…,L_{on9})/ Minimum(L_{on1}, L_{on2},…L_{on9})
4. Response time T_γ is the average time required for display transition by switching the input signal for five luminance ratio (0%,25%,50%,75%,100% brightness matrix) and is based on F_v=60Hz to optimize.

Measured Response Time		Target				
		0%	25%	50%	75%	100%
Start	0%		0% to 25%	0% to 50%	0% to 75%	0% to 100%
	25%	25% to 0%		25% to 50%	25% to 75%	25% to 100%
	50%	50% to 0%	50% to 25%		50% to 75%	50% to 100%
	75%	75% to 0%	75% to 25%	75% to 50%		75% to 100%
	100%	100% to 0%	100% to 25%	100% to 50%	100% to 75%	

4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG4.

FIG. 2 Luminance

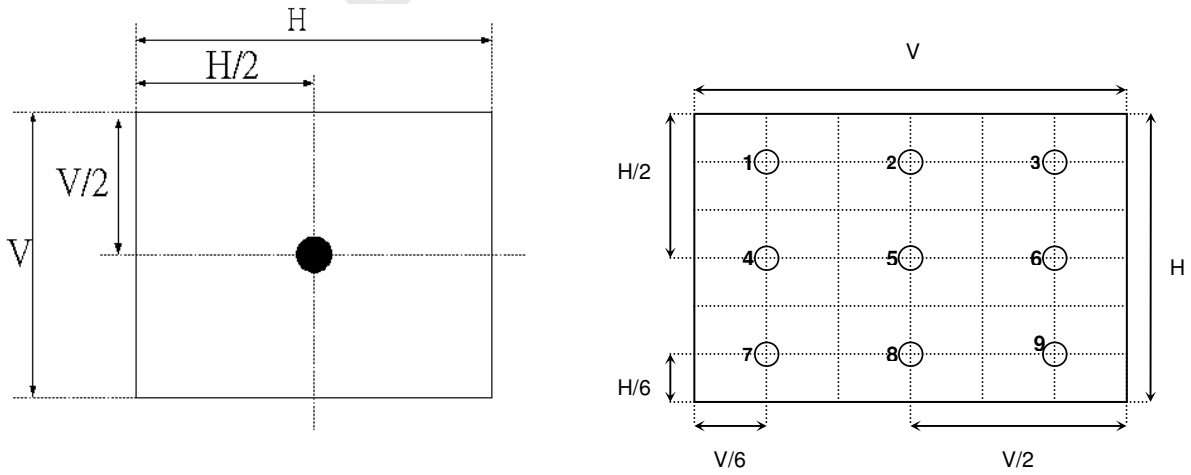


FIG.3 Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for “any level of gray(bright) “ and “any level of gray(dark)”.

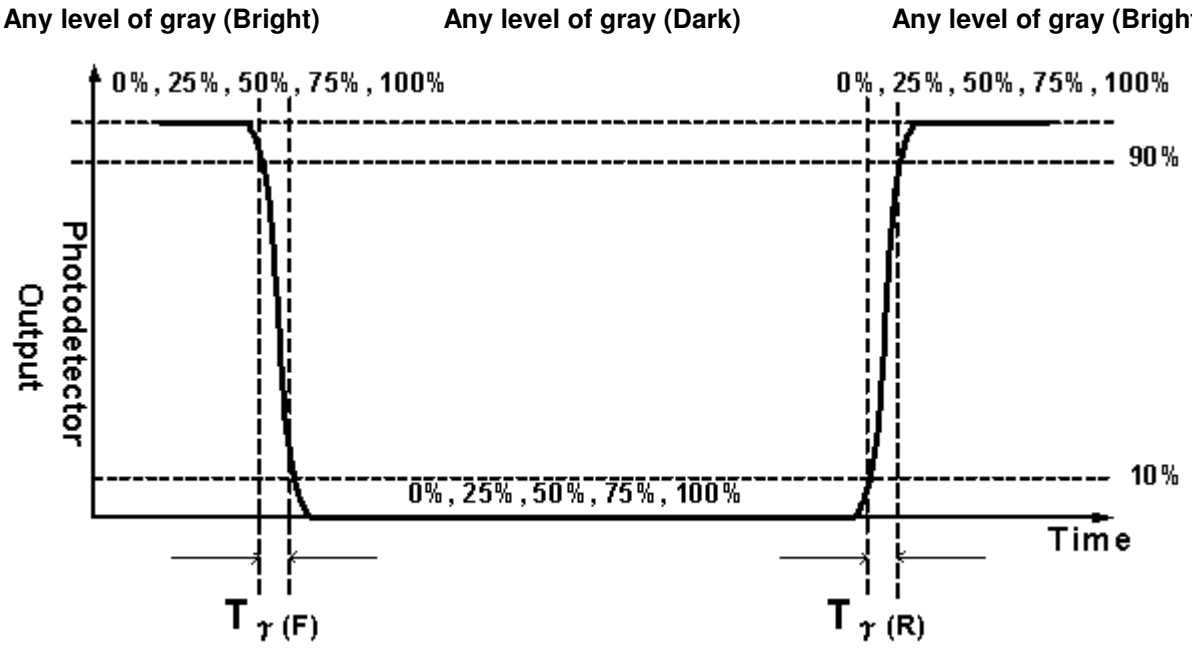
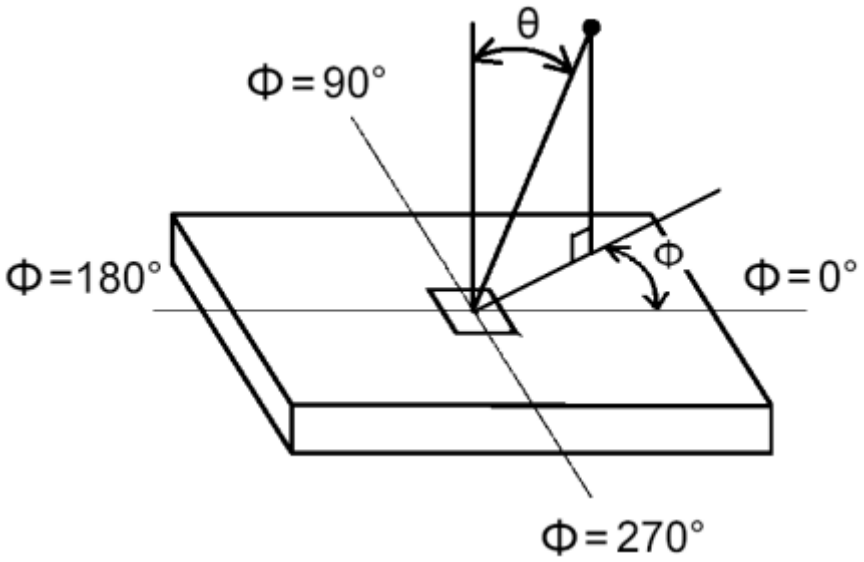


FIG.4 Viewing Angle



5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model P550HVN02.0. In addition the figures in the next page are detailed mechanical drawing of the LCD.

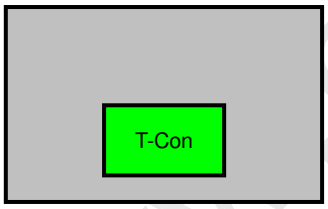
Outline Dimension	Horizontal (typ.)	1235.6 mm
	Vertical (typ.)	706.4 mm
	Depth (typ.)	25.5 mm
Bezel Opening Area	Horizontal (typ.)	1216 mm
	Vertical (typ.)	686.8 mm
Active Display Area	Horizontal	1209.6 mm
	Vertical	680.4 mm
Weight	Typ 20kg	

5.1 Placement suggestions:

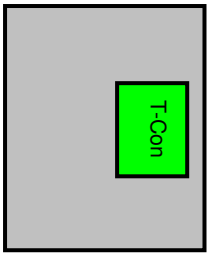
The Suggestion placement is as following:

1. Landscape mode: The T-con has to be placed on the up side from the rear view as illustrated below.
2. Portrait mode: The T-con has to be placed on the left side from the rear view as illustrated below.

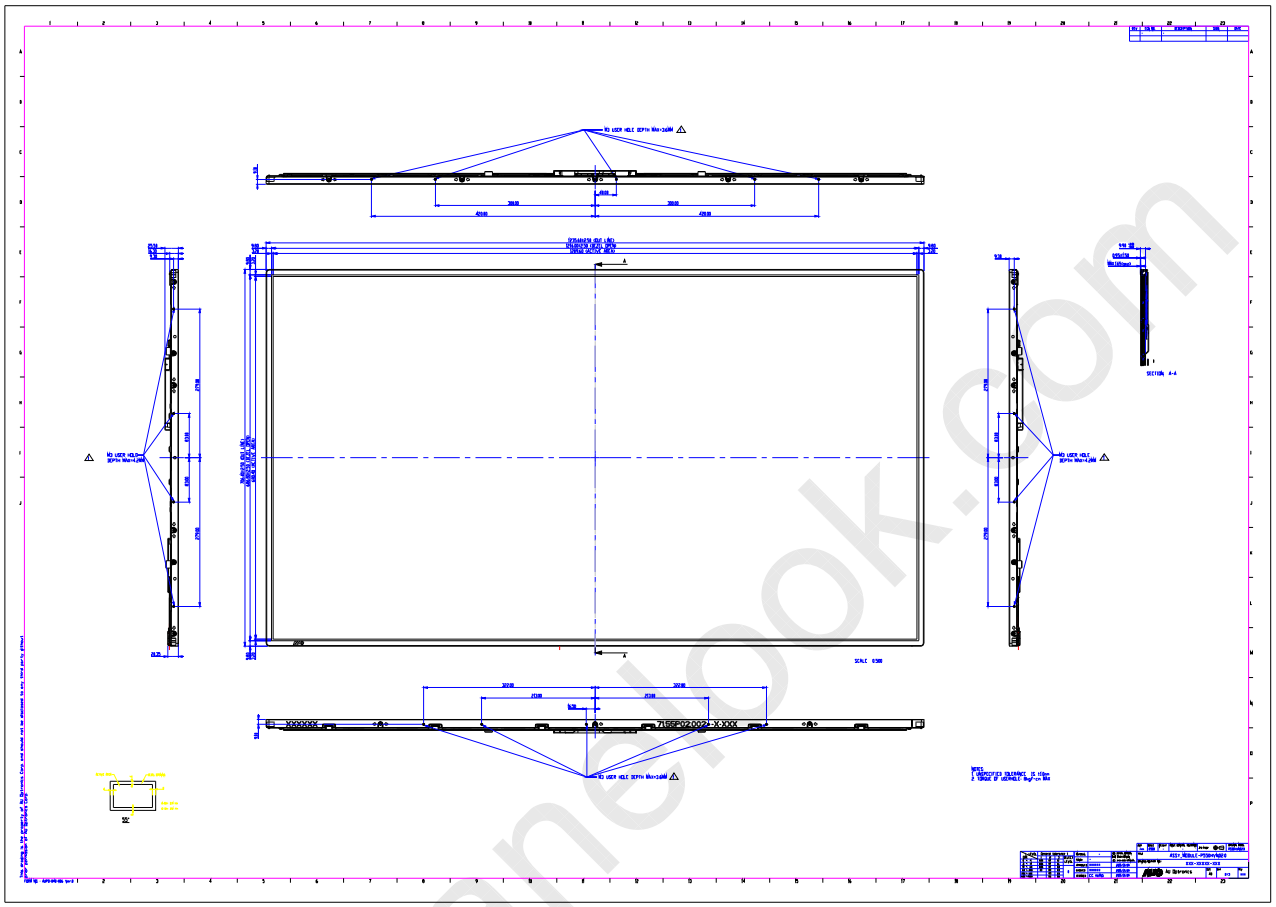
Landscape mode(Rear view)



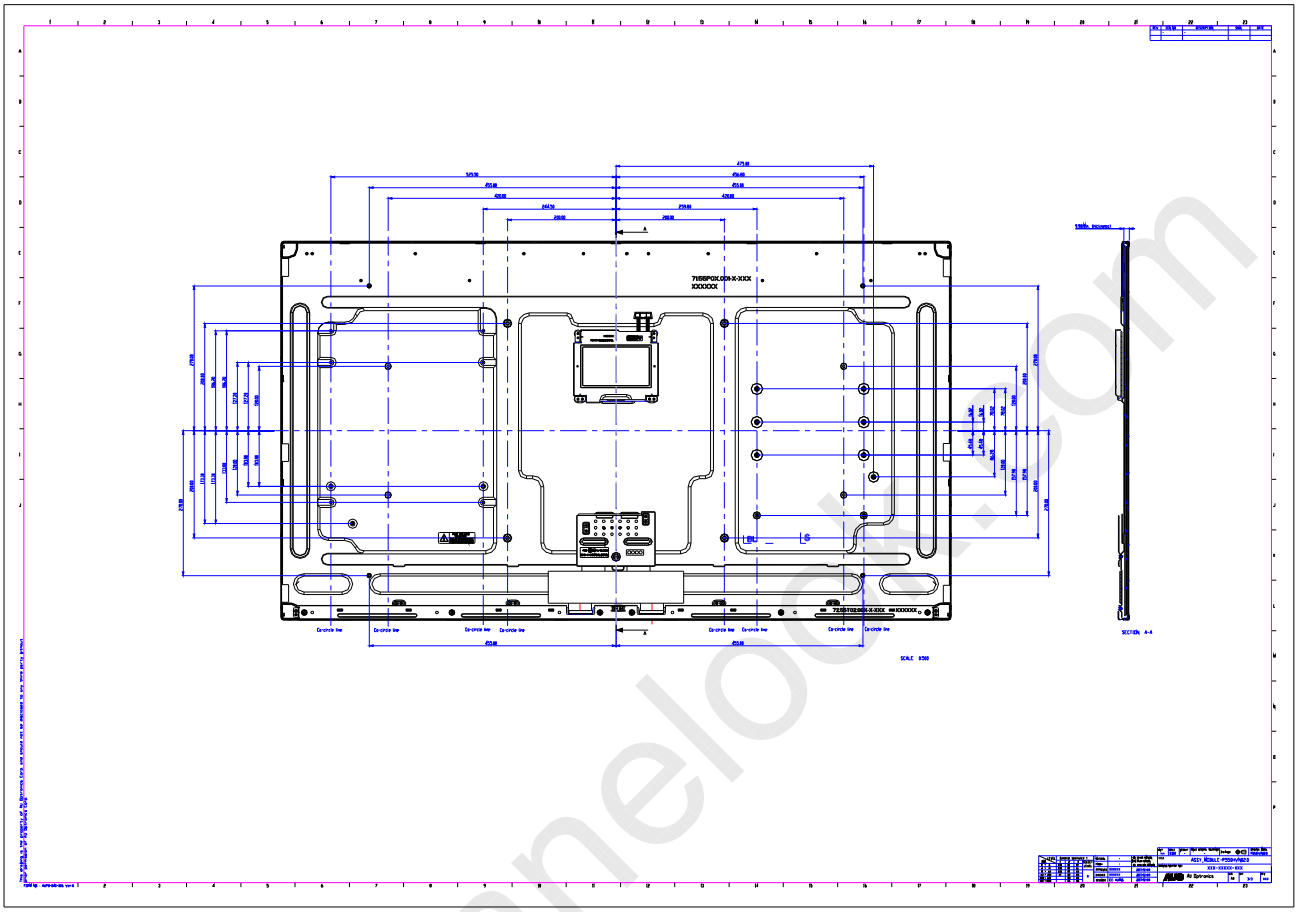
Portrait mode(Rear view)



Front View



Back View



6. Reliability Test Items

	Test Item	Q'ty	Condition
1	High temperature storage test	3	60℃, 500hrs
2	Low temperature storage test	3	-20℃, 500hrs
3	High temperature operation test	3	50℃, 500hrs
4	Low temperature operation test	3	-5℃, 500hrs
5	Vibration test (non-operation)	3	Wave form: random Vibration level: 1.0G RMS Bandwidth: 10-300Hz, Duration: X, Y, Z 10min per axes X,Y,Z : Horizontal, face up
6	Shock test (non-operation)	3	Shock level: 30G Waveform: half since wave, 11ms Direction: ±X, ±Y, ±Z, One time each direction
7	Vibration test (With carton)	1 (PKG)	Random wave (1.05G RMS, 10-200Hz) 10mins per each X,Y,Z axes
8	Drop test (With carton)	1 (PKG)	Surround four flats drop height:15 cm Bottom flat drop height:25.4 cm twice (ASTMD4169)

7. International Standard

7.1 Safety

(1) UL60950-1,2003, Underwriters Laboratories, (AUO file number : E204356)
Standard for safety of information technology equipment including electrical business equipment

(2) EN60950

(3) IEC 60065, European Committee for Electro technical Standardization (CENELEC)
Audio, video and similar electronic apparatus, safety requirement

(4) IEC 60950-1:
European Committee for Electrotechnical Standardization (CENELEC)
European Standard for safety of information technology equipment including electrical business equipment

7.2 EMC

(1) ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHz to 40GHz. “American National standards Institute(ANSI), 1992

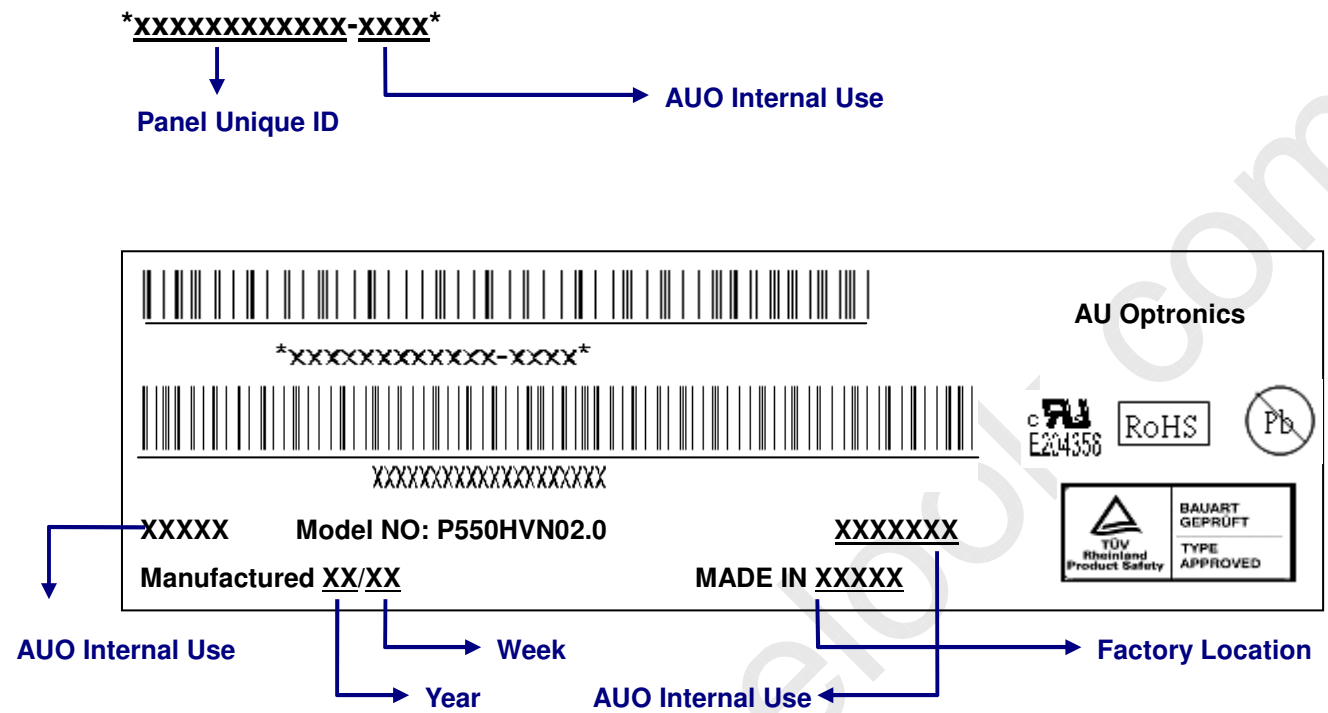
(2) C.I.S.P.R “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.” International Special committee on Radio Interference.

(3) EN 55022 “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.” European Committee for Electrotechnical Standardization. (CENELEC), 1998

8. Packing

8-1 DEFINITION OF LABEL:

A. Panel Label:



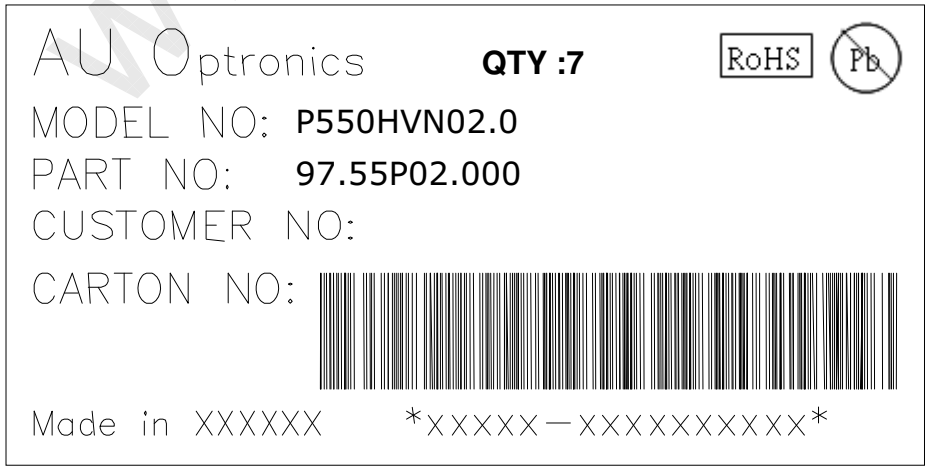
Green mark description

(1) For Pb Free Product, AUO will add Pb for identification.

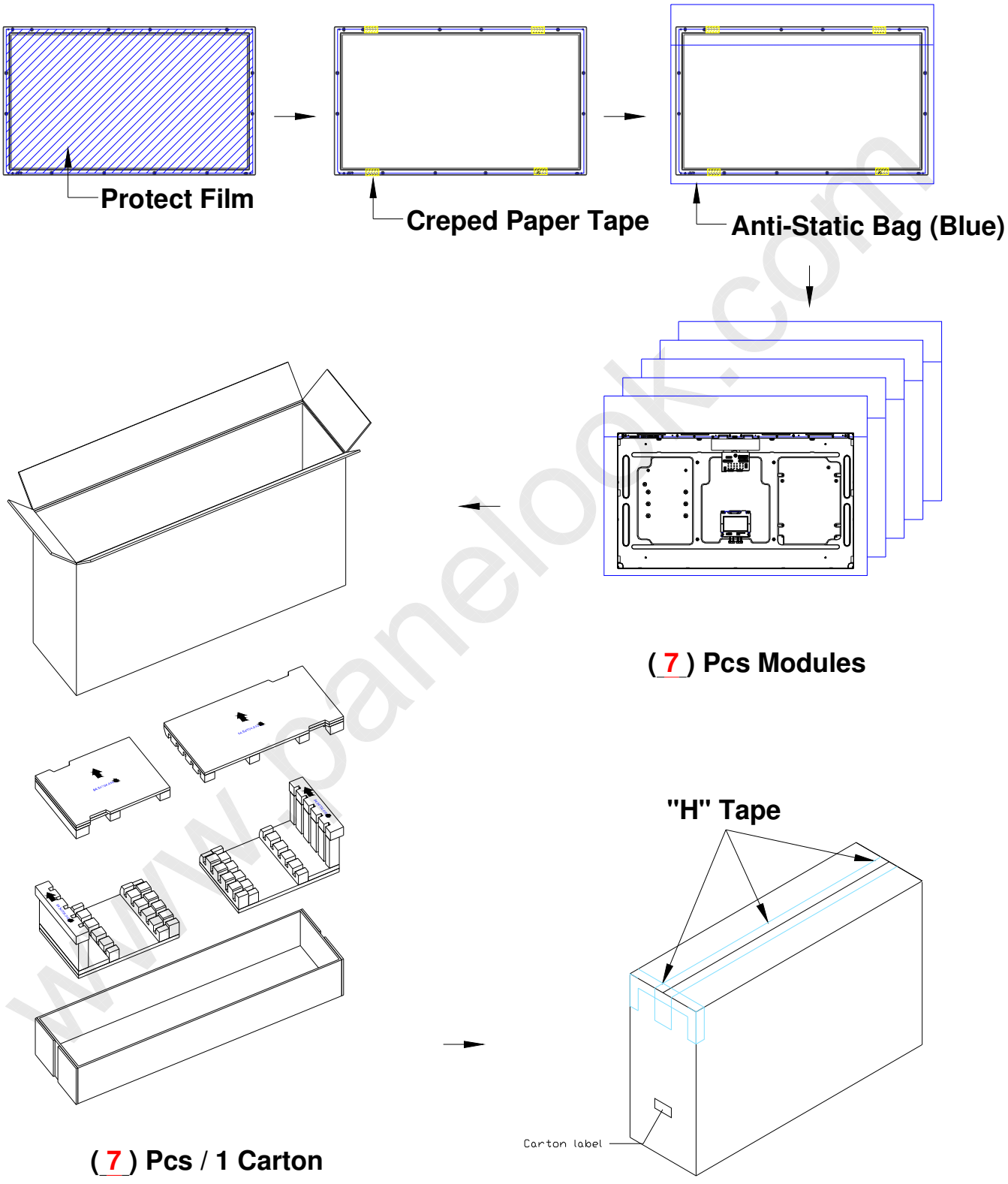
(2) For RoHs compatible products, AUO will add RoHS for identification.

Note: The green Mark will be present only when the green documents have been ready by AUO internal green team. (definition of green design follows the AUO green design checklist.)

B. Carton Label:

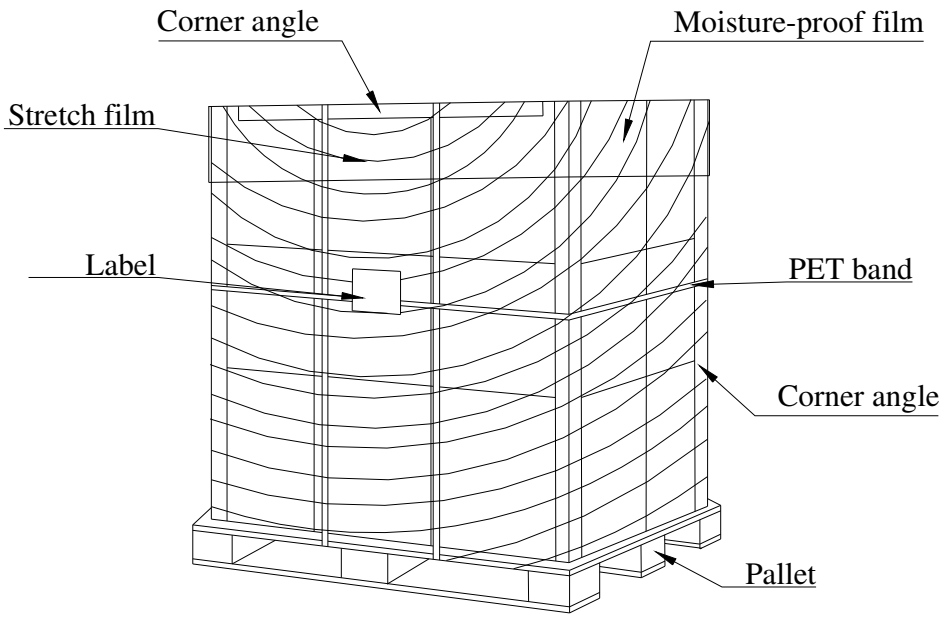


8-2 PACKING METHODS:



8-3 Pallet and Shipment Information

Item	Specification			Packing Remark
	Qty.	Dimension	Total Weight (kg)	
Packing BOX	7pcs/box	1305(L)*383(W)*800(H)	134.5kg	Box = 2.95kg Cushion = 2.05kg (Includes bottom cardboard)
Pallet	1	1315(L)*1150(W)*138(H)	20kg	
Boxes per Pallet	3 boxes/pallet			
Panels per Pallet	21pcs/pallet			
Pallet after packing (40' container)	36	1315(L)*1150(W)*938(H)	423.5kg	



9. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

9-1 MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.

(2) You should consider the mounting structure so that uneven force (ex. twisted stress) is not applied to module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.

(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.

(4) You should adopt radiation structure to satisfy the temperature specification.

(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter cause circuit broken by electro-chemical reaction.

(6) Do not touch, push or rub the exposed polarizer with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)

(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front/ rear polarizer. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.

(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.

(9) Do not open the case because inside circuits do not have sufficient strength.

9-2 OPERATING PRECAUTIONS

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage: V=±200mV(Over and under shoot voltage)

(2) Response time depends on the temperature. (In lower temperature, it becomes longer..)

(3) Brightness of LED depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.

(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.

(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interface.

9-3 ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wristband etc. And don't touch interface pin directly.

9-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5 STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

9-6 HANDLING PRECAUTIONS FOR PROTECTION FILM

(1) The protection film is attached to the bezel with a small masking tape. When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.

(2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the bezel after the protection film is peeled off.

(3) You can remove the glue easily. When the glue remains on the bezel or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

9-7 Operating Condition in PID Application

(1) If the continuous static display is required, periodically inserting a motion picture is strongly recommended.

(2) Recommend to periodically change the background color and background image.

(3) Recommend not to continuously operate over 20 hours a day.

(4) Recommend to adopt one of the following actions after long time display.

I. Running the screen saver (motion picture or black pattern)

II. Power off the system for a while

(5) Try not to run the LCD in a closed environment. Suitable venting on the system cover would be helpful for cooling.

(6) It is better to adapt active cooling with fans for long time displaying, especially for high luminance LCD model.